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Environmental Assistance as National Security Policy:

Helping the Former Soviet Union Find Solutions to its Environmental Problems

Robert L. Dunaway
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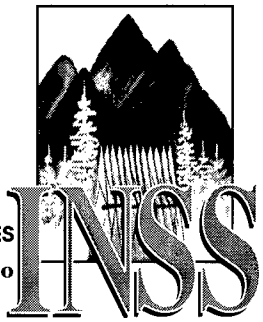
INSTITUTE FOR NATIONAL SECURITY STUDIES
U.S. Air Force Academy, Colorado



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Since the fall of Communism in the former Soviet Union, U.S. Presidents and policy makers have stressed the importance of helping Russia and the Newly Independent States develop democratic forms of government and forge strong economic and environmental ties with other nations throughout the world. The U.S. can and should play a role in helping the Commonwealth of Independent States repair decades of damage caused by Cold War-driven industrial and nuclear development.

This report describes some of the region's most serious environmental problems and their potential to spread throughout the affected areas to neighboring countries. It provides an overview of the emerging environmental component of the US. National Security Strategy first proposed by President Bush. Finally, it describes an ambitious proposal to implement geographic information system (GIS) technology as a means of helping the former Soviet Union identify and monitor existing and potential environmental hazards.

The ability to locate, analyze, and track existing damage reliably, as a prelude to predicting potential threats, is a necessary first step in developing a viable strategy to protect environmental, economic, and social resources, both in the Former Soviet Union and world-wide.

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ENVIRONMENTAL ASSISTANCE AS NATIONAL SECURITY POLICY:

HELPING THE FORMER SOVIET UNION FIND SOLUTIONS TO ITS ENVIRONMENTAL PROBLEMS

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Comments pertaining to this report are invited and should be forwarded to: Director, Institute for National Security Studies, HQ USAFA/DFE, 2354 Fairchild Drive, Suite 5D33, US Air Force Academy, Colorado Springs, CO 80840, 719-472-2717.

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FOREWORD

We are pleased to publish this fourth volume in the *Occasional Paper* series of the US Air Force Institute for National Security Studies (INSS). This monograph represents the results of research conducted during the spring and summer of 1994 under the sponsorship of a grant from INSS.

INSS is co-sponsored by the National Security Negotiations Division, Plans and Operations Directorate, Headquarters US Air Force (USAF/XOXI) and the Dean of the Faculty, US Air Force Academy. The primary purpose of the Institute is to promote research conducted within the DOD community in the fields of arms control, proliferation, national security, regional studies, the revolution in military affairs, information warfare, and environmental security. INSS coordinates and focuses outside thinking in various disciplines and across services to develop new ideas for USAF policy making. The Institute develops topics, selects researchers from within the military academic community, and administers sponsored research. We also host conferences and workshops which facilitate the dissemination of information to a wide range of private and government organizations. INSS is in its fourth year of providing valuable, cost-effective research to meet the needs of the Air Staff and our other sponsors, which include Air Force Intelligence, the Defense Nuclear Agency, and the US Army Environmental Policy Institute.

This paper, by the new deputy director of INSS, reviews some of the serious environmental problems facing the Former Soviet

Union and considers possible US responses to these issues. In particular, the author describes one possible program that would help Russia identify and catalog its environmental confusion: the Russian North-Geographic Information System (RN-GIS), a cooperative effort by the Russia Academy of Sciences and the US Air Force Academy. The RN-GIS envisions a pair of environmental data centers, one each in Moscow and Colorado Springs, which would serve to provide modern Western expertise to Russian geographers and environmentalists, and offer these experts a venue for sharing their data with the world--including their neighbors in the Commonwealth of Independent States. Major Dunaway's paper is an important piece of scholarship which reflects the new post-Cold War world and its realigned concerns. It also marks the first foray by INSS into the emerging arena of environmental security.

We appreciate your interest in INSS and its research products.. We hope we are meeting a need for this type of analysis and reflection, and we look forward to publishing these papers on a regular basis.

JEFFREY A. LARSEN, Lt Colonel, USAF
Director, Institute for National Security Studies

EXECUTIVE SUMMARY

Since the fall of Communism in the former Soviet Union, US Presidents and policy makers have stressed the importance of helping Russia and the Newly Independent States develop democratic forms of government and forge strong economic and environmental ties with other nations throughout the world. This report focuses on the role the United States can and should play in helping the Commonwealth of Independent States to repair decades of damage caused by Cold War-driven industrial and nuclear development.

This report describes some of the region's most serious environmental problems and their potential to spread throughout the affected areas to neighboring--and even distant--countries. It provides an overview of the emerging environmental component of the US National Security Strategy first proposed by President George Bush, and explains how it has been applied to the CIS. Finally, it describes an ambitious proposal to implement geographic information system (GIS) technology as a means of helping the former Soviet Union identify and monitor existing and potential environmental hazards.

The author argues that the ability to locate, analyze, and track existing damage reliably, as a prelude to predicting potential threats, is a necessary first step in developing a viable strategy to protect environmental, economic, and social resources, both in the Former Soviet Union and world-wide.

ENVIRONMENTAL ASSISTANCE AS NATIONAL SECURITY POLICY

"Don't Just Stand There . . . Do Something!"

-- Anonymous

Acknowledging the Former Soviet Union's Environmental Problems

The end of the Cold War caused the United States to redirect its existing defense and foreign policy strategies which had focused on the USSR as its--and its allies'--chief adversary. The fall of Communism spawned a new set of priorities, freeing decision-makers to devote expertise and resources to deal with another, more widespread threat: the contamination and depletion of the world's natural resources. This change in emphasis can be seen in agreements such as the Gore-Chernomyrdin Accords, the Arctic Monitoring and Assessment Program, and other demilitarization programs. Although many of these documents address environmental concerns there has been no concerted effort to establish programs to deal specifically with the serious environmental problems at hand.

Ironically, many environmental problems which the US and the former USSR are grappling with are by-products of their long-standing adversarial relationship. The resulting contamination of

resources in both countries is part of a two-edged sword. Both countries succeeded in producing vast numbers of highly lethal weapons and weapons systems which, while effective, required hazardous fuels and chemicals for operations and maintenance and proved difficult to dispose of when their usefulness had ended.

Today, both US and former Soviet military bases face huge, expensive, and labor-intensive clean-up tasks, the products of decades of combat training and testing. The legacy of these operations includes leaking underground fuel storage tanks, the widespread use of ozone-depleting chemicals (such as the fire retardant halon), chemical spills, and toxic waste dumps.

In his *Annual Report to the President and the Congress*, January 1994, then Secretary of Defense Les Aspin stated,

> New environmental, health and safety threats to US security have emerged over the past two decades. They threaten US national security and quality of life. They also threaten the Department's military mission. DoD is spending large sums of money to clean up contaminated sites, to dispose of the wastes generated, and to solve other environmental problems. . . . In 1984, Congress created the Defense Environmental Restoration Account (DERA) to fund cleanup of contaminated sites. . . . In 1994, DoD will devote $2 billion of DERA funds to cleanup activities and, for the first time, will spend more money on cleanup than on studies and investigations. (US Department of Defense 82-84)

In his report, Secretary Aspin also announced DoD's decision to create a new Office of the Deputy Under Secretary of Defense for Environmental Security (DUSD(ES)) "to meet these environmental

threats and better fulfill [DoD's] responsibilities." (US Department of Defense 82)

The former Soviet Union faces equally serious environmental challenges, spawned by seven decades of heavy military and industrial build-up. In its wake lies a legacy of aging, deteriorating infrastructure that continues to pose threats to the environment and, potentially, to the region's economic progress. However, even as the various governments of the Newly Independent States struggle to develop and institute democratic forms of government, they are expected to match the economic stability and productivity of the West without the knowledge or support to do so. Accustomed to relying on substantial support and guidance from Moscow, they must now fall back almost entirely on their own diminished resources and experience. Since the 1980s, political leaders and citizens throughout the Commonwealth of Independent States (CIS) have expressed growing concern over the severe environmental problems that threaten their quality of life and their health and economic future. However, these governments lack the funding, equipment, and technical expertise to fully address--or even assess--environmental hazards. Although the international community has acknowledged the importance of helping the CIS to become economically strong and politically stable, many potential funding organizations and governments are willing to make only limited commitments until the CIS countries demonstrate reliable stability and growth. Thus, CIS leaders feel compelled to allocate resources toward instituting democratic reforms and maintaining or increasing industrial production. Only by doing so can they hope to attract international funding, support,

and investment, and become self-sufficient and competitive in the world marketplace.

It seems clear that the CIS must receive substantial financial and technical support if it is to arrive at effective, widespread solutions to its environmental problems in the foreseeable future. For years, the US Department of Defense, various scientific organizations, and several Presidential administrations have called on the international community to offer such assistance. All have stressed the dangers environmental damage pose toward the Former Soviet Union's economic and, therefore, its political stability and of the potential for the effects of such hazards to spread beyond the region's immediate borders. Experts throughout our government have argued that by offering the CIS substantial assistance in solving their environmental problems, DoD and other federal agencies are fulfilling part of their stated commitment to strengthen US national security. If properly applied, US financial and technical support can help prevent the spread of environmental contamination from other countries to our own, encourage international industry and growth, and, by bolstering other countries' economic and political prospects, contribute to international stability and security.

Defining the Problems

Seventy years of Communist rule and the accompanying military build-up in the former Soviet Union have left a widespread, toxic stain across the landscape that will take many

decades to erase. In his 1993 study *Troubled Lands: The Legacy of Soviet Environmental Destruction,* author D.J. Peterson writes,

> Over the decades, the Soviet government consistently diverted a massive share of available resources to build up the nation's large military-industrial complex as it waged a cold war with the United States and its allies. . . . Western estimates of the share of the Soviet economy accounted for by the defense sector in the 1980s range from about 15-25 percent and even higher; Aleksi Yablokov [Russian State Counselor for Ecology and Public Health] asserted that the real figure is on the order of 50 percent. (The rate in the United States during the same period was about 5 percent). (Peterson 14)

Author Richard Sakwa offered additional insight in his 1993 book on Russian politics:

> The Soviet defense industries had absorbed about a fifth of national income every year since the Second World War. By the last year of perestroika in 1991, nothing much was left of the old Soviet centrally planned economy, but what did remain was overwhelming state ownership and a bloated defense sector. (Sakwa 225)

Peterson cites the Soviet military's inability or unwillingness to monitor the extent of environmental damage its weapons proliferation programs caused:

> As in the West, defense-related activities proved to be some of the most environmentally damaging--from groundwater contamination by industrial solvents used in the aerospace industry to radioactive and toxic contamination from unsafe

> storage and disposal of chemical, biological, and nuclear weapons. Playing on the Soviet regime's obsession with national security and secrecy, the military-industrial complex ignored the most important environmental concerns and resisted interference by pro-environmental interests. . . Speaking about Murmansk, a principal Navy port reported to be experiencing severe problems managing and disposing of radioactive and toxic waste, the head of the Soviet environmental agency [*Goskompriorda*] commented [in a 1990 issue of *Sovetskaya Kul'tura*]: "We simply do not know what's going on there." (Peterson 14)

Other sources paint an equally grim picture:

> Among the significant sources of maritime pollution are the ships and support services of the USSR Navy. Over many years in the areas of the Bay of Sevastopol where the Black Sea Fleet is moored and fueled, the level of pollution from oil and petroleum products has been high, sometimes up to 100 times the PDK [*predel'no dopustimaya kontsentratsiya*, or maximum permissible concentration]. Work on preventing oil leaks . . . is being carried out very slowly. There is no effective system in place to catch the overflows from heavy rains that carry higher loads of oil products into the bay. Still, the Defense Ministry plans to finish work on water catchment installations only in 1992. (Feschbach 126)

The Soviet military's environmental legacy includes, in addition to hazardous wastes, the existence and problems associated with the disposal of nuclear and other weapons. In an August 1994 report on the current location and control of nuclear weapons in the CIS, analysts from the Foreign Affairs and National Defense Division of the Congressional Research Service reported that the former Soviet

Union is believed to possess more than 27,000 nuclear weapons, and perhaps as many as 45,000 warheads, including 18,000 in storage. In addition to the problems associated with storing and eventually dismantling many of these weapons, international sources have raised concerns about the status of weapons still stored in the newly independent states of Belarus, Kazakhstan and, most notably, Ukraine:

> Some Russians have argued that the missiles in Ukraine have not received proper periodic maintenance and are, as a result, beginning to become unsafe. Some have argued that the warheads are also leaking radiation as a result of improper care. Russian officials contend that the absence of proper maintenance is caused by the fact that Ukraine has taken responsibility for day-to-day operations at the bases but that it lacks the technical ability to maintain the missiles. Ukraine, in contrast, insists that Russia had agreed to maintain the missiles and warheads as a part of the joint operational command of strategic systems, but that it has failed to provide needed spare parts and technical expertise. . . . Several observers have also raised concerns about the sale of Soviet nuclear materials or nuclear knowledge to nations that are trying to acquire their own nuclear weapons. In February 1993, Russia reported that uranium had been stolen from Russian facilities three times in the past two years, and there have been many reports of nuclear materials appearing on the black market in Eastern Europe. At the same time though, reports indicate that officials in eastern and western Europe have worked together to investigate and interrupt suspected cases involving the smuggling of nuclear materials. (Woolf and Galdi 4 12)

Civilian industrialization has also caused environmental contamination in the former Soviet Union, as it has in the US. Perhaps the most familiar incident in recent history is Ukraine's Chernobyl nuclear accident which, eight years later, continues to cause serious ecological and health problems in Ukraine, Belarus, and Russia. Scientists from the University of Oregon who visited the site in 1994 reported,

> At the destroyed reactor, our instruments registered several hundred times the normal background radiation. The gray walls of the sarcophagus [housing the reactor], more than ten stories high and fifty-nine feet thick in places, had been patched so often they resembled the tarred, caulked hull of a derelict ship. . . . More than 11,000 square feet of leaks have formed, and a French construction firm that was recently contracted to erect another tomb around the first one warned it could never be completely sealed. Nor could radioactive runoff from Chernobyl's cooling ponds, impounded by dikes hastily constructed at enormous cost along the Pripyat, be kept from seeping into the watershed. Once there, the runoff flows directly to the Dnieper River, Ukraine's Mississippi, the source of drinking and irrigation water for 38 million people. (Weisman 46)

Other horror stories abound, ranging from reports of massive soil erosion throughout much of Russia, harvested crops and other foods registering high levels of heavy metal contamination, and high levels of water and air pollution. According to a January 1994 article in *Sotsis*, reprinted in *Russia & CIS Today*, "In Russia, approximately 50 million people live in cities where the concentration of hazardous substances in the air is 20 times the

permissible levels, and 60 million live in cities where the concentration of hazardous substances in the air is five times the permissible concentration. Only 15 percent reside in areas where the air meets health standards." (CIS Environmental Watch 2)

The Russian Academy of Sciences has compiled troubling sets of statistics on the Circumpolar North, the area around the Arctic Circle encompassing zones of permafrost and tundra, including Russia and more than two-thirds of the CIS and part of Canada:

> The Circumpolar North has, comparatively, the most autonomous circulation of water and air masses. It contains about half of the total world's population, 80% of industrial and 70% of intellectual potential of our planet. More than 80% of world energy consumption is concentrated here. On the other hand, 55% of warming gases are emitted by the countries of the Circumpolar North. Thus, total volume of pollutant released into the atmosphere in 1990-91 was 47.5 million tons, from 380,547 former Soviet northern sources of pollution. 70% of pollutants are accumulating in the Arctic basin. Total discharge of waste into rivers and seas of the former Soviet Arctic has exceeded 2 billion cubic meters annually. (Personal Interview with Dr. Ludmila Ilyina, Senior Research Geographer, Institute of Systems Studies, Russian Academy of Sciences)

Further, the effects of military, industrial, and nuclear pollution are not confined to the borders of individual countries, or even continents:

> Western Europe, which received fallout from Chornobyl [sic], has urged Russia, Ukraine, and Lithuania to impose stringent safety measures of shut down unsafe reactors. Scandinavian nations protest smelter exhaust from Russia's Kola Peninsula. Industrial toxics waft across the Arctic to Alaska and Canada, while effluents from Siberian rivers foul Arctic fishing grounds. Even more worrisome to these neighbors, and also to Japan, are revelations of wholesale nuclear dumping at sea. (Edwards 77)

D.J. Peterson makes a similar point by outlining the potential international benefits to be gained by providing the CIS with technical and financial assistance to correct its far-reaching environmental problems:

> Russia has already taken significant steps to reduce domestic sulfur emissions; paying the country to reduce emissions at its metallurgical plants on the Kola Peninsula presents the least-cost means of controlling air pollution in Finland. Helping St. Petersburg and the Baltic states treat their sewage helps Sweden clean up its beaches at home. Western aid to seal methane leaks in gas pipelines and coal mines could reduce the potential for global warming with less expense and disruption than curtailing carbon emissions elsewhere in the world. (Peterson 254)

The author adds that the CIS has acknowledged the existence and known effects of extreme environmental insult throughout the region. Perhaps as a result, during Mikhail Gorbachev's administration funding for environmental issues increased substantially. "Total spending by the Soviet government on nature protection and the 'rational use of natural resources' in 1990

amounted to about 13 billion rubles, a 30 percent increase over levels in 1985," Peterson writes. (168)

Peterson cites numerous attempts on the part of state governments, federal agencies and private groups to identify and address environmental problems. These programs range from local pollution control efforts in Russia and Ukraine, fines levied on polluters in Belarus, and the election to the USSR Congress of People's Deputies in 1989 of such environmental activists as Aleksei Yablokov and writers Sergei Zalygin and Valentin Rasputin. The Baltic States also elected pro-environment politicians during this period. (Peterson 159-188)

During a February 1992 meeting of CIS members (with the notable exception of Ukraine), those present signed an agreement "On Cooperation in the Area of Ecology and Environmental Protection":

> In the agreement, the participant states recognized that 'borders between governments do not coincide with natural-ecological and basin boundaries,' adding that economic activity in one state 'must not cause damage to the environment, the public's quality of life, or economic activity of other states.' To this end, the parties resolved, among other points, to coordinate and cooperate on the drafting and enforcement of environmental legislation and regulations, monitoring and assessing environmental quality....preserving wilderness areas and biodiversity, and pursuing joint environmental research. (Peterson 186-87)

Economic Resources and Organizational Constraints

Russia and the other Newly Independent States are actively seeking economic assistance to develop the technology, infrastructure, and methods needed to address their environmental problems. However, such attempts have long been frustrated by a variety of governmental and bureaucratic obstacles that hinder the cooperative agreements between government ministries. Internal rivalries and poor communication networks also prevent establishing links between separate groups of people who might otherwise combine their resources and expertise to devise widespread, systematic solutions. Referring to the Communist party's strenuous attempts since the 1950s to institute laws and regulations to restrict pollution, D. J. Peterson writes:

> Responsibility for carrying out the government's modest environmental initiatives was divided among several ministries and state committees that often had priorities other than protecting the environment. One department was made responsible for collecting data, another for conducting the analyses, and a third for enforcement. Up to twenty-six separate state committees and ministries participated in the design and implementation of environmental regulations. In the case of Lake Baikal, over forty-five institutes affiliated with different departments and ministries conducted research on the ecology of the region. This arrangement frequently led to bureaucratic prerogatives, pitting one agency against another. And in a society obsessed with secrecy, the sharing of information was anathema. (Peterson 17)

The author also points out that chronically underfunded efforts to establish and enforce environmental laws coupled with the USSR's overriding concern for ever-escalating military and industrial development, greatly reduced the impact of proposed reform efforts over the following decades. Others have cited obvious conflicts of interest among those who were expected to spearhead environmental reform efforts: "Decisions about the financing of Soviet science and technology involved many of the same high-level party and governmental organs involved in the policy-making and planning processes" (Zickel 632). Needless to say, a government committed to producing military machinery in mass proportions was unlikely to cut production in that area to increase funding for environmental remediation.

Today of course, the CIS is in the throes of a vast military and nuclear draw-down that has allowed government officials and the man on the street to focus attention on environmental issues. However, given the still unsettled state of affairs caused by the Former Soviet Union's often unruly transition to a new system of government, economic system, and social conditions, few observers underestimate the challenge implementing a systematic program to address environmental concerns within the CIS. This is especially true in countries whose populations are struggling to forge new democratic governments, and to survive under desperately poor economic conditions. Millions of people are forced to rely on an aging and poorly maintained industrial infrastructure which no longer provides enough goods and services. Meanwhile, they are hurtling toward adopting a strange new capitalist system that

offers no substitutes for their previous governments' politically restrictive but economically protective safety nets.

Desperate conditions lead to desperate measures. Before the fall of Communism, a growing environmental movement in many CIS countries (primarily since the mid-1980s) led to the establishment of large political groups such as the Moscow Green Party, an organization that staged demonstrations and other forms of protest. These civil actions led to hazardous chemical plant closures and increased public concern about environmental hazards. Despite such developments, coupled with well-publicized accounts of the damage caused by nuclear accidents and poor maintenance procedures, the Russian and Ukrainian governments recently declared their intention to continue operating existing nuclear plants and build new ones as a key source of essential energy. These announcements coincide with reports from official monitoring groups such as the Russian Federal Inspectorate on Nuclear and Radiation Oversight, which reported 20,000 safety violations at Russian nuclear installations in 1993. Such dire concessions on the part of struggling countries may be inevitable. Many Soviet-era factories, however poorly run or maintained, are unique in their areas and therefore deemed essential. Specialization in the former Soviet Union was exploited to the point that each factory became invaluable in the grand scheme of production: "Unlike Western economies, the ex-Soviet region's economy lacks surplus production capacity in most sectors and, therefore, is unable to compensate for plant shutdowns by shifting production to less controversial facilities" (Peterson 240).

When discussing economic resources, I must mention the vast mineral and energy reserves known to exist but not yet tapped throughout much of the former Soviet Union. Many unmined pockets of oil, natural gas, and minerals such as gold, aluminum, uranium, and platinum group metals have been identified in remote areas that warrant specific geological and environmental examination. Scientists and businessmen, both in the CIS and abroad, seek more information about their specific location and size, recognizing them as an important source of revenue. As the authors of a 1991 Congressional Research Service report on "Soviet Energy" explained,

> Declining rates of Soviet oil and gas output and exports are a serious brake on domestic growth and foreign commerce, in the Soviet Union, East and Central Europe. Notably, reduced exports will shrink this major potential hard currency earner and severely limit imports of food and machinery. Rapidly deteriorating performance stands in sharp contrast to the rich Soviet energy reserves which could serve as an engine for growth. . . .Western assistance could include investments in all aspects of the energy chain: exploration, field management, transportation, refining and foreign marketing. . . . Without this beneficial foreign involvement, one may expect no new development of major proven oil and gas projects, and little technology transfer to close the wide gap between Soviet and Western norms in the energy chain (e.g. poor exploration, field management, transmission efficiency, refining, byproduct production, marketing, environmental safeguards). (Hardt and Kaiser 1-3)

A 1993 report on CIS world mineral markets stresses as well the importance of lending assistance to promote identifying and processing these resources:

> The development of CIS natural resources, particularly its minerals, could be a major vehicle for its economic growth. Between 1990-1992 the former Soviet Republics exported larger quantities of raw materials and metals because of the collapse of their internal military materials markets and the need for hard currency. Exports of precious metals such as gold and platinum group metals were also increased. Over the past couple of years, the US has increased its imports of CIS materials, including uranium, aluminum and platinum group metals. (Humphries 1)

As part of its commitment to assist democratic and economic reforms in the former Soviet Union, the Gore-Chernomyrdin Commission negotiated a series of agreements in 1993-94 to provide technical assistance and more than $400 million of assistance for energy resource development, trade, and environmental remediation in the CIS. Much of this support will also be used for defense conversion projects and cooperative space exploration ventures.

Environmentalists fear, however, that headlong efforts to exploit the region's natural resources, many of which are found amidst pristine or fragile ecosystems, may cause irreparable environmental damage. In 1993 members of the Russian Academy of Sciences proposed a series of thematic maps for the Circumpolar North region encompassing most of Russia:

Seventy three percent of Russia's economic potential is located in the Arctic basin. This region contains about 90% of Russian natural gas fields, two thirds of oil and coal, 95% of timber, gold and diamonds, over half of metal ores and non-metal chemical materials.

The impact of contemporary resource-utilization on natural environments is, indeed, extremely powerful. Take for example the history of 30 years of intensive oil and gas exploration in Western Siberia. During this period over 110 million tons of oil leaked out into peat moss, lakes and marshes. A continuous film of oil has covered the estuary of Ob' river. Eighteen billion cubic meters of casing-lead gases are burned annually in this area. At the same time, Russian Ministries concerns are extended to the industrial expansion in the Arctic: more than 30 oil and gas fields are presumed to occur on the Yamal peninsula on the shelves of the Barents and Kara seas, often under contract to Canadian oil and gas companies. . . . Arctic ice masses are melting, releasing pollutants which have accumulated during 50 years of economic development and testing of nuclear arms. In this situation, sustainable development of the Circumpolar Northern countries is impossible.

This grim picture of environmental degradation and economic destabilization underlines the urgency of international cooperation on economic-ecological research endeavors and scholars of similar interests. International exchange of experiences, mutual assistance and support are the order of the day. This is especially important for Russia, Canada and the USA, countries which are most interested in sustainable development and nature conservation in the Circumpolar North. (Russian Academy of Sciences, Institute of Systems Studies 1-3)

Current and past scientific studies conducted by experts in the CIS and abroad provide sufficient evidence of severe contamination in the resource-rich but environmentally vulnerable Circumpolar North Region. International observers should remember, however, that the ramifications of existing and future contamination have the potential to extend far beyond the area's borders. Sweden and Norway have reported contamination from Ukraine's Chernobyl nuclear accident, and, according to Russian nuclear scientist Valery Bulatov, during above-ground nuclear tests conducted in the 1940s, Russian scientists tracked the course of radiation clouds as they swept from Siberia into Alaska. The very real threat of transnational migration of numerous contaminants from this heavily polluted region is indeed a cause for international concern. (Bulatov 65)

Committing US Support to Economic Development and Environmental Stability in the Commonwealth of Independent States

Since the late 1980s, US leaders have acknowledged that the former Soviet Union's efforts to institute permanent democratic reforms will succeed only if they are based on a foundation of economic, social, and political strength. As one of the first steps in helping the Commonwealth of Independent States to achieve such stability, President George Bush and President Boris Yeltsin on 17 June 1992 issued a "Joint Statement on Science and Technology Cooperation," one of many US-Russian Summit documents on

economics, trade, and scientific issues. Through this statement, the two leaders reaffirmed their countries' long-term commitment to scientific cooperation and agreed to support "efforts underway in both countries to convert defense-related industries to civilian purposes." The two leaders reported that "both sides expressed satisfaction in the progress made in establishing the International Science and Technology Center in Moscow with its important task of redirecting the talents of weapons scientists to peaceful purposes." In February 1992, Secretary of State James Baker pledged $25 million for the center, which is committed to preventing nuclear and chemical weapons proliferation and to finding or developing peaceful employment opportunities for Russian military scientists.

Congress also weighed in by passing the FREEDOM Support Act of 1992 which states that "the dimension of the problems now faced in the independent states of the former Soviet Union makes it imperative for donor countries and institutions to provide the expertise and support necessary to ensure continued progress on economic and political reforms." In addition to economic and humanitarian efforts, the legislators called for initiatives ensuring "improvement in the collection and analysis of statistical information" and "promotion of cooperative research efforts to validate and improve environmental monitoring of protracted radiation exposure." In April 1992, the former Soviet Union met requirements for support under the Soviet Nuclear Threat Reduction Act (also known as the "Nunn-Lugar Act") which authorizes funding for Russia's and other CIS countries' efforts to dismantle and destroy nuclear and chemical weapons and convert

defense industries to civilian use. In 1992, the US government pledged $100 million in aid designed to develop and support research projects to keep Russian scientists working in Russia. This figure represents only a small portion of the $800 million funding package Congress approved that year to help Russia, Ukraine, Belarus, and Kazakhstan to dismantle their nuclear weapons programs.

The proposed "Circumpolar North Information System" data collection and mapping project between the US Air Force Academy and the Russian Academy of Sciences also meets key objectives spelled out in the Former Soviet Union Demilitarization Act of 1992. The legislation reads, "The Congress finds that it is in the national security interest of the United States to . . . support the demilitarization of the massive defense-related industry and equipment of the independent states of the former Soviet Union and conversion of such industry and equipment to civilian purposes and uses; and to expand military-to-military contacts between the United States and the independent states of the former Soviet Union."

In the 1993 National Security Strategy of the United States, President Bush drew an analogy between current national policy and that of the 1930s when "the United States took the lead in laying the foundation for a global economic system based on multilateral cooperation, liberalized trade, international institutions for financial cooperation and development assistance and other mechanisms." He added, "These institutions are proving their worth today in responding to the new challenges of aiding the former Communist countries."

During 1993, the US provided Russia with $355 million in technical assistance. In September 1993, Congress approved a $2.45-billion assistance package for the Newly Independent States which included a $1.8 billion bilateral package first announced during the G-7 economic summit held in Tokyo in July 1993. Several months earlier the Clinton Administration stated its commitment to seek $1.3 billion in bilateral assistance to Russia and the Newly Independent States. Both funding packages emphasized the areas of energy, environment, housing, technical, and humanitarian assistance. Also in September, the US Agency for International Development signed an agreement to launch the Russian-American Enterprise Fund for which $300 million in foreign assistance appropriations had been earmarked. Among the many proposed initiatives slated for support under the fund were defense conversion initiatives and a project to design a geological database. (US Department of State, June 1994 366-371)

In his January 1994 *Annual Report to the President and the Congress,* Secretary of Defense Les Aspin acknowledged the defense establishment's increasing awareness of "the importance of environmental security to national defense" demonstrated by the creation of a new Office of the Deputy Under Secretary of Defense for Environmental Security. Secretary Aspin cited several "critical elements" in DoD's new environmental strategy, including the importance of establishing firm international cooperative agreements. "By facilitating bilateral agreements with advanced nations, the Department can speed the development and transfer of innovative technologies for defense-related environmental problems," he pointed out. He also stressed the importance of

providing "international environmental assistance" to countries of the former Soviet Union, concluding, "Educating Eastern European military personnel on environmental issues holds the potential to stop the rampant spread of contaminants, improve the health of soldiers and surrounding populations, speed conversion of military facilities to economically viable use, and ease historical distrust between populations and militaries in this part of the world." (US Department of Defense 88-89)

During their summit meeting in Vancouver, Canada, 3-4 April 1993, President Bill Clinton and Russian President Boris Yeltsin agreed to develop a program to sponsor energy, space, and science and technology projects that would benefit both countries. This agreement led to a new cooperative venture, the US-Russian Joint Commission on Economic and Technological Cooperation (the venture, also known as the Gore-Chernomyrdin Commission, was established through agreements signed by Vice President Al Gore and Prime Minister Viktor Chernomyrdin in September 1993). In June 1994 the commission issued a memorandum calling for cooperative efforts to promote development of offshore mineral resource development and "the sharing of scientific and technical information . . . on geology, resource assessment, environmental protection, economic and socioeconomic analysis, and risk protection." (US Department of Interior 2) The commission has initiated a broad range of agreements aimed at increasing bilateral trade between the two countries and developing a variety of environmental, scientific, energy policy, and defense programs.

In his March 2, 1994 statement to the Senate Appropriations Committee, Secretary of State Warren Christopher

cited the Administration's proposed FY 95 International Affairs budget request for $900 million to support reform in the former Soviet Union: "Our dollars provide capital to Russian entrepreneurs and loan guarantees to American exporters and investors: our dollars extend technical expertise to democratic reformers, from local councils to government ministries. . . . In short, we are supporting those who are building a market economy in Russia and those who have a stake in sustaining stable democratic institutions." (US Department of State, 14 March 1994 141)

President Clinton stressed the importance of such initiatives in his 1994 *National Security Strategy*:

> The core of our strategy is to help democracy and markets expand and survive in other places where we have the strongest security concerns and where we can make the greatest difference. This is not a democratic crusade; it is a pragmatic commitment to see freedom take hold where that will help us most. Thus, we must target our efforts to assist states that affect our strategic interests, such as those with large economies, critical location, nuclear weapons, or the potential to generate refugee flows into our own nation or into key friends' and allies'. . . . Russia is a key state in this regard. If we can support and help consolidate democratic and market reforms in Russia (and the other newly independent states), we can help turn a former threat into a region of valued diplomatic and economic partners. In addition, our efforts in Russia, Ukraine and other states raise the likelihood of continued reductions in nuclear arms and compliance with international nonproliferation accords. (Clinton 19)

Shortly after being nominated to serve as Deputy Secretary of State, Strobe Talbot, then serving as the US Ambassador to Russia, testified before the House Foreign Affairs Committee in January 1994:

> As President Clinton stressed in his [January 1994] Moscow speech, Americans want Russia to succeed in its transformation, not just for its sake or for Europe's sake, but for our own. A stable, democratic, market-oriented Russia, a Russia secure in its own borders and respectful of the borders of others, a Russia integrated rather than contained, will mean fewer US tax dollars spent on defense; a reduced threat from weapons of mass destruction; new markets for US products; and a powerful, reliable partner for diplomacy as well as commerce in the 21st century. (US Department of State, 31 January 1994 37)

The President also stressed the importance of initiating and supporting international efforts to help CIS countries overcome their potentially devastating environmental problems: "The United States has focused technical assistance and encouraged non-governmental environmental groups to provide expertise to the republics of the former Soviet Union and East European nations that have suffered the most acute environmental crises." (US Department of State, 6 June 1994 37)

As early as February 1993, President Clinton demonstrated his awareness of the strategic importance of helping the former Soviet Union identify and address the environmental effects of past nuclear and industrial proliferation by introducing the

Environmental Technology Initiative. This initiative encourages the export of American environmental technologies; in addition to a variety of remediation programs and techniques, the initiative specifically cites the importance of introducing systems to manage environmental data collected from the field. Other proposed assistance programs include a $1.6 billion initiative announced during President Clinton's 4 April 1993 Vancouver summit meeting with President Yeltsin to cover previously proposed or existing projects aimed at helping Russia improve its energy, environmental, housing, and business sectors; an additional $1.3 billion in bilateral programs promised by the US; and the FREEDOM Support Act for which the Administration sought $704 million in FY 94 for additional support in these key areas. On 24 August, 1994, the President signed into law the FY 1995 Foreign Operations Export Financing and Related Programs Appropriations Act (PL 103-306) which allocates $850 million in a broad range of bilateral assistance to the former Soviet Union.

One Solution: The Russian North-Geographic Information Systems Project (RN-GIS)

The former Soviet Union's numerous environmental problems have been thoroughly documented, but to date there is no unified, nation-wide program to address them. Although various studies and remediation projects are underway, all are limited in scope, and no one has attempted to ensure compatibility between various systems and techniques. Therefore, various research and scientific teams from the CIS and other countries conducting such

projects have no way to share the information they gather with others, or to apply their findings to portions of the CIS outside the particular area under study.

It is important to note that support for developing effective national environmental projects in the CIS, especially those that have been endorsed by its leaders and scientists, can reinforce strong environmental policies championed by key decision-makers. Such joint cooperative efforts have the potential to strengthen relations between the cooperating countries and contribute and promote environmental security regionally and internationally. Such joint efforts are also the first step in helping CIS scientists and researchers acquire and apply the expertise their western counterparts bring to these projects. The host country participants would not be passive aid recipients but project partners with the goal of becoming self-sufficient. They would continue the work independently while sharing its results with the rest of the scientific community, long after infusions of international aid have ceased.

The next step for policy makers in the former USSR and this country is to determine how the US can best help the CIS to assess and address these problems. What type of assistance and support can this country offer that will lead to the development of long-term solutions to environmental problems in the CIS? Such assistance should not take the form of hand-outs or short-term projects of limited scope but a long-term strategy and program that scientists, scholars, and policy makers can adopt and expand, using national resources and expertise.

One possible solution is creating a geographic information system (GIS) that will help the former Soviet Union gather, analyze, and display vital statistical information on the types of existing hazards. A reliable, nation-wide data collection and analysis system would allow experts to track the location, severity, and impacts of existing hazards and predict their long-term impacts, both within and ultimately beyond the region's borders. This information could also help scientists to develop various measures to reduce or eliminate these hazards and their effects. An effective GIS could help scientists monitor the migration of contaminants through groundwater, predict the effects of airborne pollutants within and beyond national boundaries, and help users conduct advanced computer modeling to determine the effectiveness of proposed or existing remediation efforts. Such a system would also allow researchers to track the effects of population growth and migration and the current and projected status of rivers, forests, and other natural resources.

To meet the ever-growing demand for such tools, cartographers and hardware/software developers have worked together to develop geographic information systems. An article on GIS published in the November 1992 *Journal of Forestry* offers an excellent example of how graphical GISs are produced and their potential applications:

> A GIS can be defined as a system for entering, storing, manipulating, analyzing, and displaying geographic or spatial data. These data are represented by points, lines, and polygons, along with their associated attributes. . . . For example, the points may represent hazardous waste site

> locations; the attributes associated with each site may be the specific chemical dumped at the site, the owner and the date the site was last used. Lines may represent roads, streams, or other linear features, while polygons may represent areal features such as vegetation types of land use.
>
> Recent technological developments and refinements in GIS computer hardware, software, and data acquisition techniques have revolutionized land management and land planning. The GIS link between locations and attributes makes it possible for decision-makers to simulate the effects of management and policy alternatives. GIS is a potentially powerful tool because knowledgeable users can quickly search, display, analyze, and model spatial information. In addition, maps and other data can be updated more quickly and accurately with GIS than by conventional methods. (Congalton and Green 13-14)

Since the end of the Cold War, separate groups of researchers throughout the CIS have been collecting statistical data about the region's environmental characteristics and conditions manually or by using software they have created themselves. The Russian Academy of Sciences, Institute of System Studies, has documented the existence of as many as 30 different, incompatible systems currently used to collect and manipulate such data. The lack of a centralized system for this work has resulted in the proliferation of small, individual pockets of information and processes, none of which can share data with other systems. Since neither the data nor the computer technology used to compile and manipulate it matches western GIS standards, sources outside the CIS cannot use or supplement them.

Well established mapping procedures are lacking as well. Many existing maps of the former Soviet Union were constructed in accordance with internally-developed standards that do not correspond to any followed by other countries. The lack of adequate hardware, software, and up-to-date methodologies has hampered many cartographers' efforts to capture current and changing conditions in the former Soviet Union.

Although a variety of federal, private, and commercial organizations have launched mapping projects in Russia (the US Geological Survey, the University of Oregon, and Environmental Systems Research Institute (ESRI) are three examples), all of these efforts are limited, local in scope, and to a large extent, mutually exclusive. None of the software programs currently employed are designed to share information with other existing systems, and the proposed projects are not intended to collect information about large areas of Russia and other CIS countries.

In March 1993, I traveled to Canada to meet with Dr. Ludmila Ilyina, a senior research geographer at the Institute of System Studies, Russian Academy of Sciences. Working with a US software developer, Dr. Ilyina and her colleagues have produced the first-ever computerized Russian Atlas which contains data on the Russian economy, transportation, population, natural resources, and other vital statistics. The Russian Academy of Sciences intends to expand this resource and develop additional means to store such information and display it graphically in a series of thematic and reference maps that can be used by scientists, researchers, and policy makers throughout the former Soviet Union.

In July 1994, I traveled to Russia with an Air Force Academy team to discuss the feasibility of helping the Russian Academy of Sciences to develop a GIS system designed to organize the data and standardize its storage and presentation. The Institute for National Security Studies and the US Army Environmental Policy Institute funded this mission.

Most of the software and data collection and analysis we saw during the trip was conducted manually or produced using software written by the users themselves. None of the data appeared in a format that other agencies could use cooperatively. The Russian computer experts we met were highly skilled and innovative; when they had difficulty using the limited types of off-the-shelf software available to them, many developers simply devised unique products, writing their own code on the spot as needed. However, their access to--and experience with--current technology is limited. They are clearly aware of their current inability to match Western software and hardware requirements and of the need to modernize in order to compete with developers and products in the international community.

Recent work performed by Dr. Valery Bulatov is a case in point. At the request of the Russian government, Dr. Bulatov, an eminent nuclear scientist, has produced many maps showing his efforts to locate all of the major contamination sites, both military and civilian, in the Former Soviet Union. Although some of the contamination data from particular sites such as Chernobyl had been published elsewhere, we had no prior access to much of the information he provided. Much of the information would be very useful to scientists and policy-makers who wish to identify and

remediate many of the region's environmental problems. However, at the time of our visit, no copies existed of one of Dr. Bulatov's maps which featured hand-drawn symbols and a typewritten legend carefully glued to the page. During his visit with us, Dr. Bulatov admitted that due to the inaccuracy of official Soviet maps, he was forced to rely on US Defense Mapping Agency maps to navigate the area he visited.

During our visit, we met with scientists, representatives from numerous government ministries, states committees, and Russian ministries, all of whom expressed an interest in working with the US Air Force Academy to establish a national GIS data center in Moscow. This center would be a central data collection point and a clearinghouse of key statistical information presented in a variety of formats. This information would give scientists, researchers, and key decision-makers across Russia, and potentially beyond, access to vital socio-economic, demographic, and environmental data in a standardized and highly accessible format. Our proposal also calls for establishing a duplicate data center at the US Air Force Academy (USAFA) in Colorado Springs. The USAFA-based center would provide continuous technical support to the Moscow-based center and serve as a distribution point for data Moscow agrees to release for international study and use.

The proposed "Agreement for Future Cooperation" between the Institute of Systems Analysis, Russian Academy of Sciences, and the US Air Force Academy calls for "the creation of a compatible information system for the reinforcement of scientific cooperation and mutual exchange of spatial information in the Circumpolar North Region." During our visit, we also met with

General Colonel Petr Deinekin, Commander-in-Chief of the Russian Air Force. General Deinekin suggested that Russia and the US could use a centralized data center to implement two major projects. The first concerns analyzing, planning, and implementing air and sea corridors between Russia and North America with a project called Arctic Bridge. The second project calls for using GIS to analyze the environmental status of military airbases slated for conversion to civilian use. Gen Deinekin expressed his enthusiastic support for the project, as did Victor P. Kuramin, Russian Minister of National and Regional Affairs, who assured us that Prime Minister Viktor Chernomyrdin has been kept apprised of and has also showed interest in this initiative. We have also received strong encouragement for the proposal from Secretary of State Warren Christopher.

The Air Force Academy hopes to eventually implement an initial program featuring sample GIS work stations at USAFA and the Russian Academy of Sciences. We are seeking funding support from various federal agencies for this initial phase of the project, which will help us to test the feasibility of launching a comprehensive and self-sustaining GIS-based National Data Center in Moscow within three to five years. By the end of the start-up phase the center, which will belong to the Russian government, will be fully staffed by Russian participants. The USAFA-based center will be maintained and administered by the Air Force Academy. Both centers will need long-term support to carry out this joint information-sharing and technology-enhancing initiative which will bring intellectual, commercial, and environmental benefits to the former Soviet Union, the United States, and other countries that

may be affected by Russia's changing environmental and socio-economic conditions.

Conclusion: Making and Implementing Policy

It behooves policy-makers who are concerned with issues of national and international security to understand the scope of the Former Soviet Union's environmental problems. These resource-depleting and, in many cases, life-threatening hazards harm the populations' health and have the potential to hinder the Newly Independent States' economic, social, and political progress, thereby hindering their continuing struggle to institute democratic reforms. Failure to address these issues endangers human and natural resources throughout the affected region and, potentially, the world. The consequence may be widespread social, economic, and political destabilization within the former Soviet Union and beyond.

Despite their awareness of and genuine concern over these hazards, key decision-makers and experts in the CIS are hampered in their attempts to address environmental problems by three things: a lack of financial resources, little or no access to tools and methodologies to identify and assess specific problems accurately, and inadequate organizational structures and communication links which prevent separate groups of scientists and other experts from communicating and jointly devising a comprehensive environmental recovery strategy. The Commonwealth of Independent States must overcome these obstacles if it hopes to solve environmental problems which, if allowed to grow unchecked,

may threaten these states' natural resources, the health of their citizens, and their economic and perhaps long-term political health as well.

These states are dealing simultaneously with numerous challenges, all of them unfamiliar and daunting. They must learn to adopt new economic structures and methodologies that call for privatization and increased production in order to become globally competitive. For the first time, these citizens must also deal squarely with a failing industrial infrastructure without previously existing support or control from Moscow. They must also explore and adopt new and unfamiliar democratic forms of government, seeking leadership from a field of inexperienced candidates who are called upon within a few months or years to reverse the wasteful damage caused by 70 years of Communist control.

As these newly independent states struggle to establish separate identities and allegiances, they are also faced with numerous volatile challenges ranging from a resurgence of potentially violent nationalism to the need to deal with widespread environmental waste and its dangerous effects on its population and industries.

Russia, Ukraine, Kazakhstan, and Belarus must also cope with the existence of nuclear weapons within their borders. Citizens in each country are torn between fear of the international security threat this firepower may pose and these weapons' potential use as a bargaining chip to prevent future aggression from Russia. Ironically, these weapons are now a potential threat to the very oppressor who distributed them so widely to guard against a Western foe who has since become an ally.

All successful attempts to solve current problems and prevent new ones begin with the ability to identify and monitor accurately the factors and effects of past damage. Decision-makers must also predict and plan for future changes, be they intentional or inevitable. The proposed Russia North-Geographical Information System project, initiated by Russian and US partners through the National Data Centers, represents an important first step in this direction. By establishing a national information collection, processing, and distribution center, the participants will link expertise and information that can help Russia and the Newly Independent States comprehend existing problems, develop long-term solutions, and prevent future damage. This information will also help the CIS to understand economic, social, and demographic conditions within and beyond their borders. Introducing new technology will help these countries share information and build cooperative business opportunities with each other and with Western governments and entrepreneurs. The United States and other countries will gain an increased understanding of a formerly almost impenetrable region of the world and will, by helping the CIS to become more economically and politically stable, increase its own national security and forge new bonds that may help to bolster international peace and cooperation throughout the world.

Most importantly, the joint Russian North-GIS project will become a self-sustaining project, fully staffed by Russian participants who will produce valuable research and information to be shared with the international scientific community and marketed to other requesters for use in commercial projects. The duplicate center based at the US Air Force Academy will help to

transmit information provided by the Moscow center to researchers in this country and use the data for faculty and student-conducted research.

Both the Russian Academy of Sciences and the US Air Force Academy realize that no amount of international support alone will solve the former Soviet Union's environmental problems. Both parties agree that such joint projects and other forms of international assistance should be offered not as solutions, but as tools that the key leadership can use to develop and apply existing expertise, acquire and share information with other members of the international community, and contribute to environmental stability and cooperation nationally and abroad. These goals are summed up in the "Agreement for Future Cooperation" between the Russian Academy of Sciences and the US Air Force Academy which calls for the joint development of a geographical information system. This will enable Russia to collect vast amounts of scientific data on the Circumpolar North and to store and present it according to widely-accepted Western standards. The agreement paves the way for international transmission of valuable statistical information, currently inaccessible or yet to be collected, about a little-known part of the world. This system may also serve as the model for developing an internationally united geographical information system whose products (statistical data, reports and maps) could be used to collect and disseminate environmental information worldwide.

Knowledge is power. The ability to collect, organize, interpret, and exchange valuable information may give a consortium of scientists and policy-makers the power to enhance

international stability and security by increasing communication and encouraging joint solutions to many problems the world shares. The Russia North-GIS project may be an important first step in the United States' commitment to help Russia develop solutions to its environmental problems and to forge similar cooperative efforts with other countries as well.

# # #

In a free world, if it is to remain free, we must maintain, with our lives if need be, but surely by our lives, the opportunity for a man to learn anything.

-- Robert Oppenheimer

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